

Project Report

| | |
|---------------|---|
| Project Name | Smart waste Management System for metropolitan cities |
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1. INTRODUCTION

The project is based on the concept of Automation used in waste management system under the domain of Cleanliness and Hygiene. Dumping garbage onto the streets and in public areas is a common synopsis found in all developing countries and this mainly end up affecting the environment and creating several unhygienic conditions. In order to deal with these problems Smart net bin is an ideology put forward which is a combination of hardware and software technologies i.e. connecting Wi-Fi system to the normal dust bin in order to provide free internet facilities to the user for a particular period of time. The technology awards the user for keeping the surrounding clean and thus work hand in hand for the proper waste management in a locality. Smart net bin uses multiple technologies firstly the technology for measuring the amount of trash dumped secondly the movement of the waste and lastly sending necessary signal and connecting the user to the Wi-Fi system. The proposed system will function on client server model, a cause that will assure clean environment, good health, and pollution free society.

1.1. Project Overview

The Smart Waste Management System is a very innovative system which will contribute to the path towards Smart City. In our city, we usually observe that the trash bins put at open spots are always over-burden. It forms unsanitary conditions to the city and it is not optimized to solve the problem by currently existing waste management in Malaysia. Also, the traditional way of manually monitoring the wastes in dustbins is a complicated process and excessive more human effort with expenses. To avoid all such situations, a project called Smart Waste Management System is implemented. This system is developed to perform the connectivity of mobile application with Internet of Things (IoT) based dustbins. These dustbins are developed using IoT. IoT is the system of physical devices implanted with software, sensors and network connectivity which empowers these items to gather and trade information. The status of dustbins will be determined using ultrasonic sensor and collected data send through network to the database. The mobile application is used to monitor dustbins and perform route direction to the dustbins. The methodology which applies in developing this project is Adaptive Software Development (ASD). The benefits of this scheme are to reduce used of human resources and efforts together with the enhancement of Smart City. The prototype of this project is evaluated by some users before published to ensure the system can be enhanced in future works. Key words: Smart City, Smart Waste Management mobile

1.2. Purpose

The amount of waste produced every day by the industries and the households is increasing at an appalling rate, and the major reason for this is soaring use of packaged items, textiles, paper, food, plastics, metals, glass etc, thus management of this refuse becomes a crucial part in our everyday life. In most of the developed countries there are many efficient techniques which are used for the proper management of this waste, but in some countries especially the developing ones the careless attitude of people towards maintaining clean surroundings, along with this many issues such as no stringent laws for using the biodegradable materials, no proper environmental policies, no laws for sustainable development are the seed for the fatal results of waste management. Due to the increasing waste, the public bins which are used for collecting this waste are overflowing, the locality is jumbled of trash, causing not only malodorous streets but also a negative impact on the health and environment. It is a very salient issue to deal and discover the proper remedies for it some of them are like government should enact stringent laws against the people throwing trash, against the industries for not using biodegradable material, more use of recycle items, reduce the use of non-degradable stuff, reuse the items, thus implementing this can reduce the waste up to some extent. Along with this use of technology for proper dumping of trash and diminishing its hazardous effects is the concept put forward. The internet nowadays has the world under its spell. Not a single person lives without internet, phone, tablet or laptop. It is believed without connectivity one cannot move ahead in today's world but sometimes due to heavy plans or connectivity issues we can't access the internet, and thus attracting people towards free Wi-Fi. Providing free Wi-Fi facility for dumping waste into the dustbin would solve the issue of waste and the internet facility plus availability of free service would help people go crazy and would act as a reward for maintaining cleanliness in the locality.

2. LITERATURE SURVEY

This is not an original idea, IOT based dustbin was implemented and effectuated much before. Some authors presented systems where the sensors in the bin checked if the bin are filled up to the brim or not. If it was filled an automated message was sent to the server end of the system, through the Arduino SIM module, which used the application of the Arduino board. Once the server received the message it forwarded the message to the worker in charge, if the worker was available, he would notify his/her presence by accepting the work and would reach the required destination. If the worker was not available, the work would be transferred to another worker.

Some authors also implemented real time waste management system by using smart dustbins to check the filled level of dustbin whether they were filled. In this system the information of all smart dustbins can be accessed from anywhere and anytime by the concern person and he/she can take a decision accordingly. By implementing this proposed system, the cost reduction, resource optimization, effective usage of smart dustbins was carried out. This system indirectly reduced traffic in the city. In major cities the garbage collection vehicle visits the area's every day twice or thrice depending on the population of the particular area. The System informed the status of each and every dustbin in real time so that the concerned authority can send the garbage collection vehicle only when the dustbin is full.

Some proposed smart garbage management system using IR sensor, microcontroller and Wi-Fi module. This system assured the cleaning of dustbins soon when the garbage level reached its maximum. If the dustbin was not cleaned in specific time, then the records were sent to the higher authority who took appropriate action against the concerned contractor. This system also helped to monitor the fake reports and hence helped to reduce the corruption in the overall management system. It ultimately helped to keep cleanliness in the society.

Progressively the Dustbin with Wi-Fi Router attached in it was also introduced. The Dustbin had a Passive Infrared Sensor. The Wi-

Fi router was programmed to display the temporary connecting code. When the user threw trash in the dustbin, the PIR sensor detected the trash and sent signal to the microcontroller. The microcontroller detected the signals and forwarded it to the router device. The router verified the signals and generated random codes and then forwarded it again to the microcontroller. The microcontroller scanned the signals and forwarded it to the LCD Display. The LCD Display displayed it. The user entered the random code generated by the router on the PHP interface which was hosted on the server. The server then responded to the request and displayed the Master Wi-Fi password to the user. The user then used the Master Wi-Fi password to connect to the internet. The user got the internet access for 10 minutes and automatically got disconnected.

2.1 Existing problem

The main problems of the existing solid waste collection process and management system are as follows:

- More complications in the processing.
- many controlling units linked with each other
- higher implementation cost

2.2 References

- [1] P. Suresh, Vijay. Daniel, R.H. Aswathy, Dr. V. Parthasarathy, "A State-of-the-Art review on Internet of Things" International Conference on Science Engineering and Management Research (ICSEMR), IEEE, DOI: 10.1109/ICSEMR.2014.7043637 19 February 2015.
- [2] Parkash, Prabu V "IoT Based Waste Management for Smart City" International Journal of Innovative Research in Computer and Communication Engineering, Vol.4, Issue 2, DOI: 10.15680/IJIRCCCE.2016.0402029, February 2016.
- [3] Evaluation on the Performance of Urban Domestic Sewage Treatment Plants in China- 2011 Dongmei Han; Guojun Song
- [4] Teemu Nuortio, Jari Kyto, Jukka Harri Niskaa, Olli Bra, ysyb "Improved route planning and scheduling of waste collection and transport", Expert Systems with Applications 30(2006)223–232, Elsevier
- [5] M. Arebey, M. Hannan, H. Basri, and H. Abdullah, "Solid waste monitoring and management using RFID, GIS and GSM", The IEEE Student Conference on Research and Development (SCoReD), 16–18 November 2009, UPM Serdang, Malaysia, 2009.

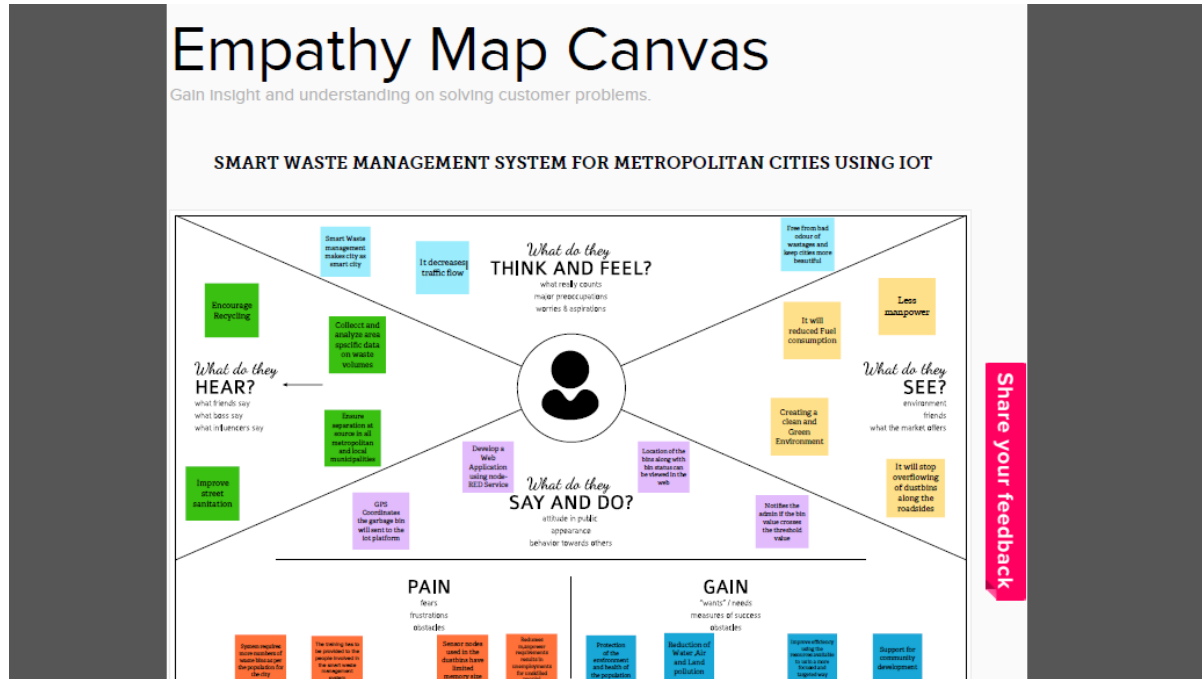
2.3 Problem Statement Definition

Waste Generation Solid waste generation rates estimate the amount of waste created by residences or businesses over a certain amount of time (day, year, etc.). Waste generation includes all materials discarded, whether or not they are later recycled or disposed in a landfill. Waste generation rates for residential and commercial activities can be used to estimate the impact of new developments on the local waste stream. As a consequence, if solid waste management is to be accomplished in an efficient and orderly manner, the fundamental aspects and relationship involved must be identified, adjusted for uniformity of data, and understood clearly. Indiscriminate dumping of solid waste and failure of the collection system in a populated community would soon cause health problems.

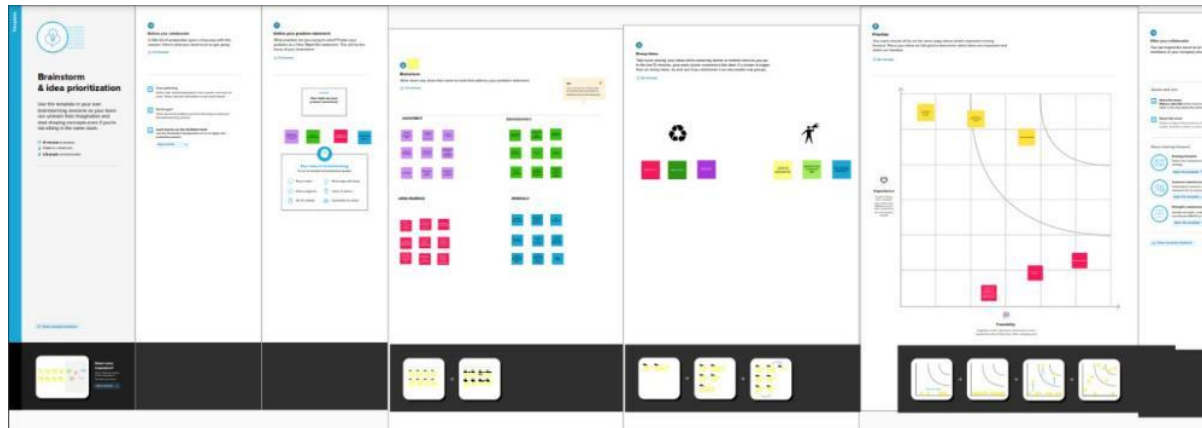
| | | |
|---------------------|--|--|
| I am | <i>Describe customer with 3.4 key characteristics - who are they?</i> | Stakeholders are people and organisations having an interest in good waste management, and participating in activities that make that possible |
| I'm trying to | <i>List their outcome or "job" they care about - what they are trying to achieve?</i> | Clean environment, Healthy atmosphere, Pollution less air, clean and neat smart city. |
| But | <i>Describe what problems or barrier stand in the way what bothers them most?</i> | Surrounding becomes unhygienic, causing not only cluttered streets and bad odors but also negative health and environmental impacts. |
| because | <i>Enter the "root cause" of why the problem or barrier exists - what needs to be solved</i> | Garbage overflow because of improper collection waste on time. |
| Which makes me feel | <i>Describe the emotions from the customer's point of view - how does it impact them emotionally</i> | People feel like unhealthy, unpleasant smell that makes them irritated and air is polluted due to the garbage overflow. |

3. IDEATION& PROPOSED SOLUTION

3.1 Empathy Map Canvas



3.2 Ideation & Brainstorming

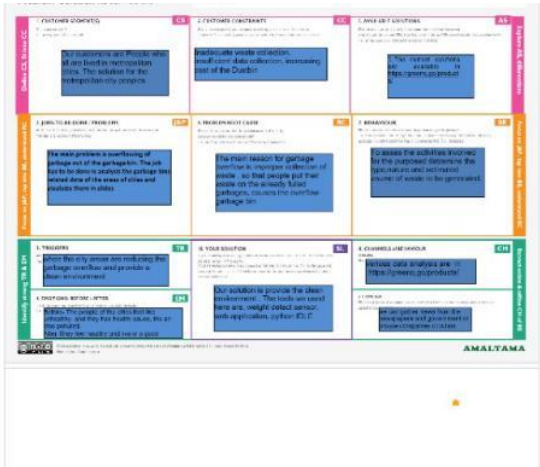


3.3 Proposed Solution

| S. No. | parameter | Description |
|--------|--|--|
| 1 | Problem Statement (Problem to be solved) | Population growth and rapid urbanization lead to a huge increase in waste generation, so the traditional methods of waste collection have become inefficient and costly. |
| 2 | Idea / Solution description | Most efficient way this extraordinary amount of waste can be solved is |

| | | |
|---|---------------------------------------|---|
| | | through smart waste management with obsolete methods of waste collection |
| 3 | Novelty / Uniqueness | Save money, protect the local environment, create jobs, build resilience, reduce emissions and promote community. |
| 4 | Social Impact / Customer Satisfaction | Clean Cities, Healthy Environment |
| 5 | Business Model (Revenue Model) | Offering Software as a Service model to Government |
| 6 | Scalability of the solution | The project is very effective in managing waste in any big city. Here priority system is used to the city is clean all the time without any overflowing dumpsters |

3.4 Problem Solution fit



4. REQUIREMENT ANALYSIS

4.1 Functional requirement

| FR.NO | Functional Requirements | Sub Requirement (Story/Sub-Task) |
|-------|-------------------------|--|
| FR-1 | User registration | Registration through e-mail id & Mobile number |
| | | |

| | | |
|------|---------------------|--|
| FR-2 | User confirmation | Confirmation via email Confirmation via OTP |
| FR-3 | Web application | Web application |
| FR-4 | Configure to Device | IBM Watson IOT Platform |
| FR-5 | Database | Detailed database of bins and stands |
| FR-6 | Python Script | IBM IOT Platform |

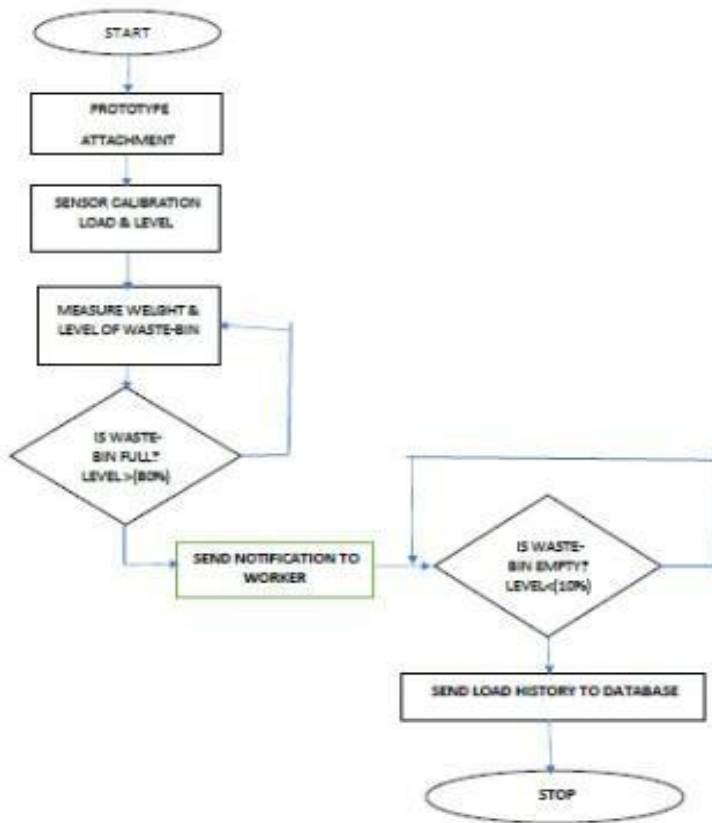
4.2 Non-functional requirement

| FR.NO | Non-Functional Requirement | Description |
|-------|----------------------------|---|
| NFR-1 | Usability | The reduction of waste |
| NFR-2 | Security | Prediction in bin fulness |
| NFR-3 | Reliability | Effective waste disposal |
| NFR-4 | Performance | Optimize source allocation, reduce running costs and increase sustainability of waste services |
| NFR-5 | Availability | Available for the allocated time by the municipality or the private companies |
| NFR-6 | Scalability | This is very effective in managing waste in big city. Here priority system is used to clean the city all the time without any overflowing dumpsters |

5. PROJECT DESIGN

5.1 DATA FLOW DIAGRAM

A Data Flow Diagram (DFD) is a traditional visual representation of the information flows within a system. A neat and clear DFD can depict the right amount of the system requirement graphically. It shows how data enters and leaves the system, what changes the information, and where data is stored. A smart waste management platform uses analytics to translate the data gathered in your bins into actionable insights to help you improve your waste services.



5.2 SOLUTION AND TECHNICAL ARCHITECTURE

SOLUTION ARCHITECTURE



TECHNICAL ARCHITECTURE

The Deliverable shall include the architectural diagram as below and the information as the table 1 &table 2.

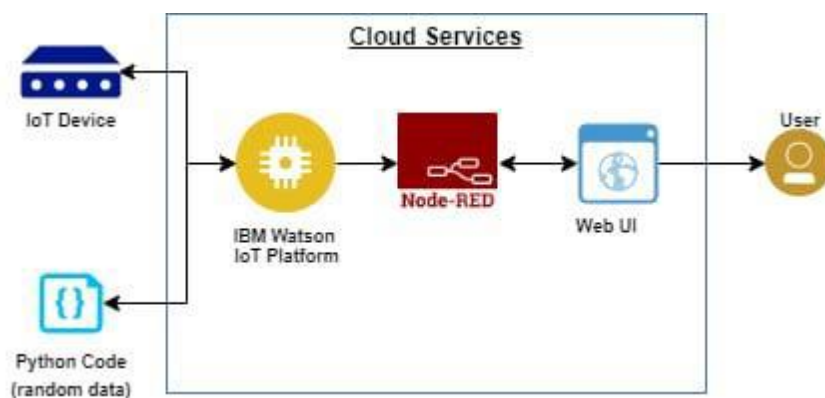


Table-1:Components&Technologies:

| S. No. | Components | Description | Technology |
|--------|----------------|---|---------------------------|
| 1 | User interface | User interact with application using form,loginrequest notification | Python/HTML/MYSQL/JAVA 2. |

| | | | |
|---|---------------------------|--|---|
| 2 | Registration | User register in the application to connect bank account | Python/HTML/MYSQL/JAVA 2. |
| 3 | Verification | Verification in the application to connect bank account | Python/HTML/MYSQL/JAVA 2. |
| 4 | Sensor(IOT device) | A device that responds to a physical stimulate and transmit a resulting impulse. | Raspberry pi/Arduino UNO/Temperature sensor/ultrasonic sensor |
| 5 | Sends notification | Sends the notification to the cloud database | IBM Cloud |
| 6 | Cloud Database (Node Red) | Database service on cloud | Node Red |
| 7 | Application | A computer software package that performs a specific function directly for an end user | IBM Waston STT service |

Table-2: Application Characteristics

| S.No | Characteristics | Description | Technology |
|------|-----------------------|---|------------|
| 1 | Open-Source Framework | Open source is a term denoting that a product includes permission to use its source code,design documents or content. | Bootstrap |
| 2 | Scalable Architecture | It connected with scalable architecture | IBM Watson |
| 3 | Availability | This application access is availble at the work time of the workers according to their corporation or municipality. | Python |
| 4 | Performance | Record resource requests and save registered information. Availability of application. | IBM Watson |

USERS SEORIES

| User type | Functional Requirement | User story number | User Story/task | Acceptance criteria | Priority | Release |
|-----------|------------------------|-------------------|--|---|----------|----------|
| Customer | Controller | USN-1 | Operated via the distributed control system at any different locations within the area | The sensor will sents the notification to the user when the dustbin is full, and its notify that the garbage full and flow up | High | Sprint-1 |
| Customer | Controller | USN-2 | Application is installed and database collected through this application | Sensor to application connection is established | High | Sprint-2 |
| Customer | Controller | USN-3 | Through the above operations the waste is collected | Sensor to application connection is established | Low | Sprint-3 |

PROJECT PLANNING AND SCHEDULING

6.1 SPRINT PLANNING & ESTIMATION

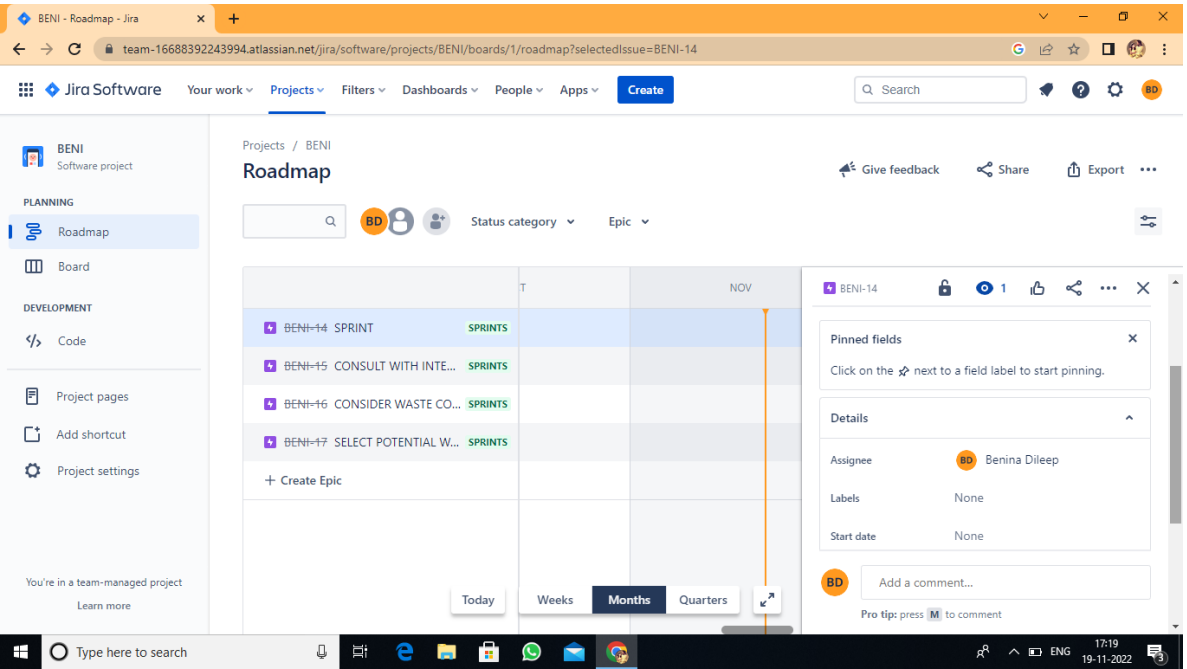
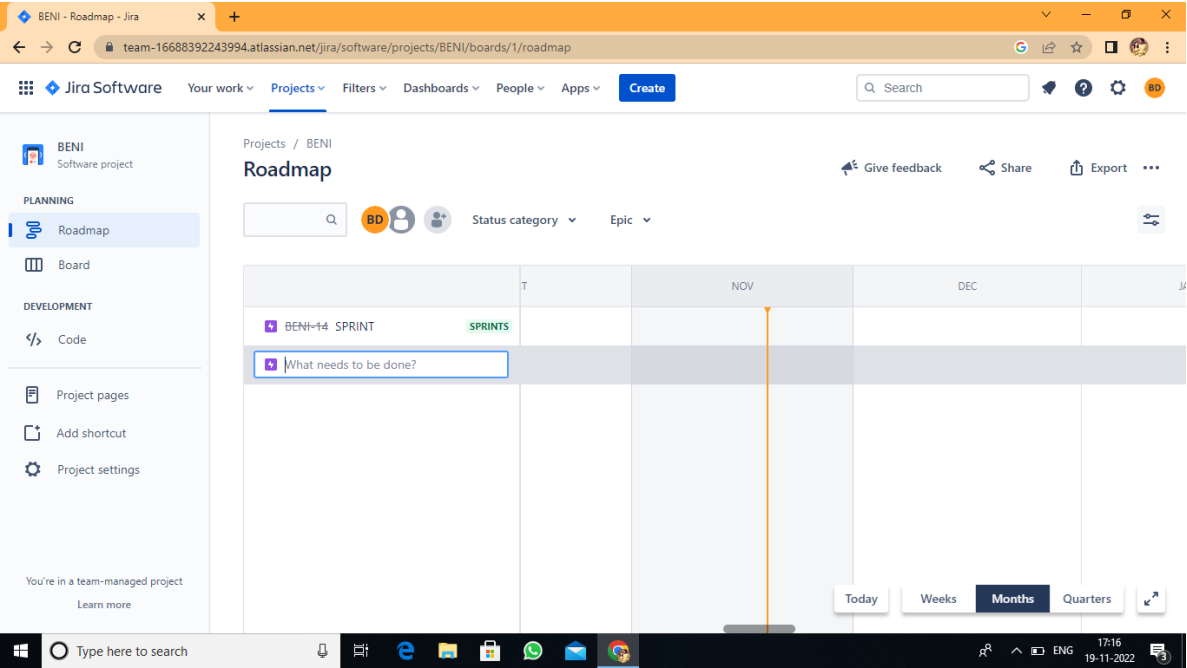
| PHASE | TITLE | DESCRIPTION |
|-------|---|---|
| | Literature survey & Information gathering | Literature survey on the selected project & gathering information by referring the, technical papers , research publications etc. |
| | Prepare Empathy Map | Prepare Empathy Map Canvas to capture the user pains & Gains, prepare list of problem statement. |
| | Ideation | List the by organizing the brainstorming session and prioritize the top 3 ideas |

| | | |
|------------------------|-----------------------------------|---|
| | | based on feasibility & importance. |
| Phase -1 | Proposed solution | Prepare the proposed solution document , which includes the novelty, feasibility of idea, business model , social impact, scalability of solution, etc. |
| | Problem Solution Fit | Prepare problem solution fit document. |
| | Solution Architecture | Prepare Solution Architecture document. |
| Phase-2 | Customer Journey | Prepare the Customer Journey maps to understand the user interactions & experience with the applications. |
| | Functional Requirement | Prepare the Functional and Non Functional document. |
| | Data Flow Diagram | Draw the data flow diagrams and submit for review. |
| | Technology Architecture | Prepare the Technology Architecture diagram. |
| Project Planning Phase | Prepare Milestone & Activity list | Prepare the milestone & activity list of the project. |

6.2 SPRINT DELIVERY SCHEDULE

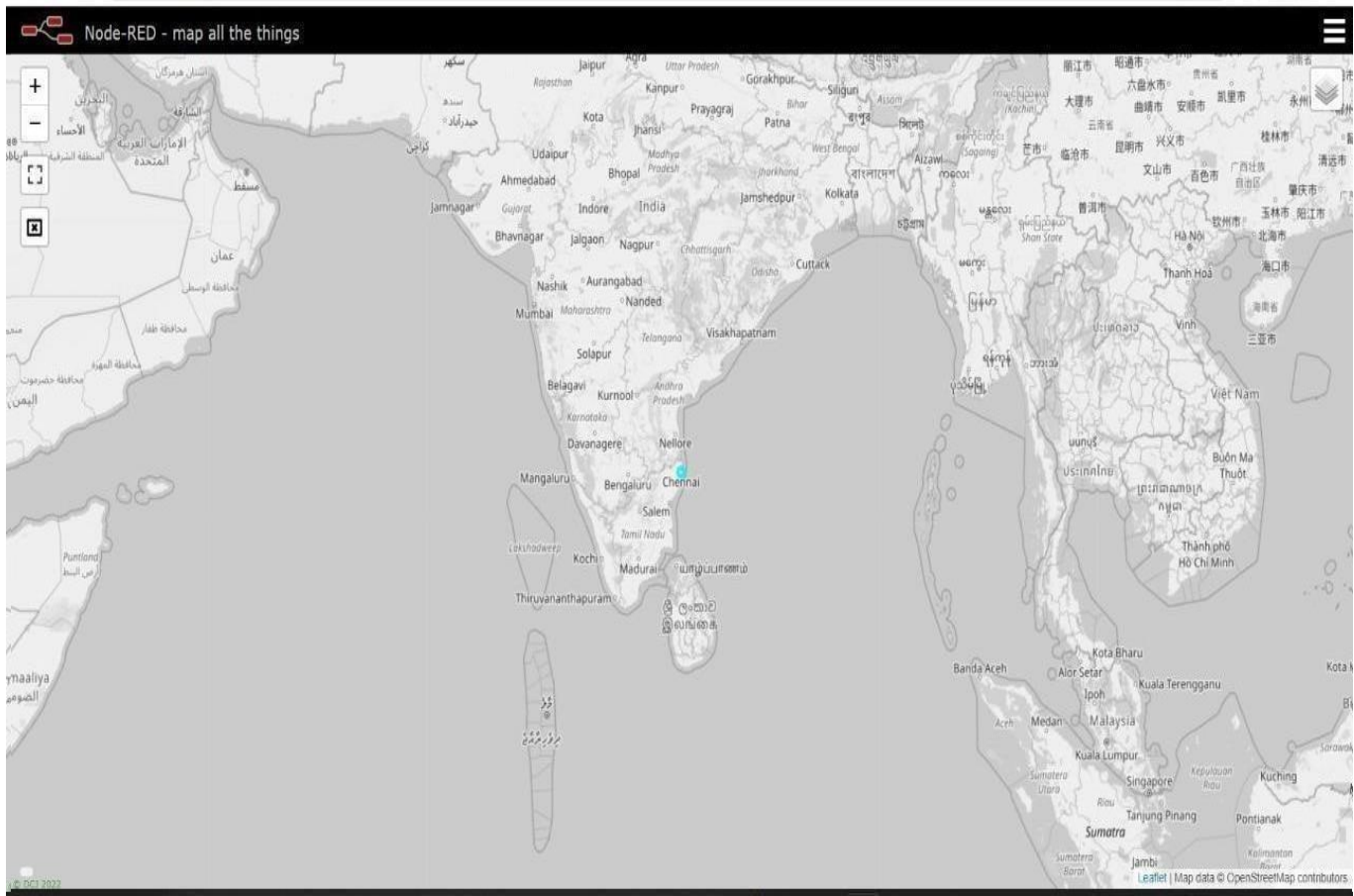
| Sprint | Functional | Task point | Story members | Priority | Team |
|----------|--------------|---|---------------|----------|--------------|
| Sprint-1 | Registration | As a team lead, I can enrolled the project by entering my email, password and within that I can enter my team members name and their email. | 2 | High | Gayathri |
| Sprint-1 | | As a team lead, I will receive confirmation email once, I have enrolled for the project with team id and along with team members name. | 2 | High | Gayathri |
| Sprint-1 | login | As a team member , I can login to the IBM portal by entering email & password. | 1 | Medium | Krishnave ni |
| Sprint-2 | | As a team member, I can login to the IBM portal by entering email & password. | 1 | Medium | Beninal |
| Sprint-2 | | As a team member, I can login to the IBM portal by entering email & password. | 1 | Medium | Gayathri |
| Sprint-2 | Medium | As a team member, I can login to the IBM portal by entering email & password. | 1 | Medium | Anna Prabha |

6.3 REPORTS FROM JIRA



7. CODING & SOLUTIONNING

7.1 Feature 1- LOCATION TRACKER



7.2 Feature 2 – LIVE UPDATE ON COLLECTED DATA

| Smart Waste Management | |
|------------------------|----------------|
| Monitoring layout | |
| BIN 1 | |
| Location | Chennai - MMDA |
| Distance | 12 |
| Load cell | 15 |
| NEED BIN CHANGE !!!! | |
| | |

8. TEASTING

8.1 Test cases

| TEST CASE ID | FEATURE TYPE | COMPONENT | TEST SCENARIO | PREREQUISITE | STEPS TO EXECUTE | TEST DATA | EXPECTED RESULT | ACTUAL RESULT | STATUS | COMMENTS | TC FOR AUTOMATION(Y/N) | BUG ID | EXECUTED BY |
|-------------------|--------------|-----------|---|--------------|---------------------------|---------------------------|-----------------------|---------------------|--------|------------|------------------------|--------|---------------|
| LOGIN PAGE_TC_001 | FUNCTIONAL | HOME PAGE | VERIFY THE USER IS ABLE TO SEE THE LOGIN/SI | | 1. ENTER URL AND CLICK GO | https://169.51.204.219.30 | L0gin page is visible | Working as expected | PASS | Successful | | | KRISHNAVENI P |

| | | | | | | | | | | | | | |
|--|--|--|---|--|--|-----|--|--|--|--|--|--|--|
| | | | G N UP WEN USER CLICK ON MY ACCOUNT BUTTON | | 2.VER IFY LOGI N/SI GN UP | 106 | | | | | | | |
|--|--|--|---|--|--|-----|--|--|--|--|--|--|--|

| | | | | | | | | | | | | | | |
|--------------------------|----|------------------|---|--|---|--|---|--------------------------------|------|---------------------|--|--|--|---------------|
| LOGIN PAGE_TC _002 | UI | HOM E PAGE | VERIFY THE USER IS ABLE TO SEE THE LOGIN/SI G N UP WEN USER CLICK ON MY ACCOUNT BUTTON | | 1. ENT ER URL AND CLICK GO 2. VER IFY LOGI N/SI GN UP Eleme nts a.ID text bo x B . passw ord text box c..logi n butto n D.ne w user E.alre ady have an accou nt | https:// 1 69.51.2 0 4.219.3 0 106 | Applicat ion should show below UI elemen t | Workin g as expecte d | PASS | Succ ess full | | | | ANNA PRABHA K |
|--------------------------|----|------------------|---|--|---|--|---|--------------------------------|------|---------------------|--|--|--|---------------|

| | | | | | | | | | | | | | |
|----------------------|----------------|-------------------|---|--|---|----------------------------------|--|--------------------------------|------|--------------------|--|--|-------------------|
| LOGIN PAGE_TC_003 | FUNCTI ONAL | LOGI N PAGE | VERIFY THE USER IS ABLE TO SEE THE LOGIN/SI G N UP WEN USER CLICK ON MY ACCOUNT BUTTON | | 1.ent er url and click go 2.click on my accou nt 3.Ent er valid ID 4.Ent er valid passw ord 5.click on login | Id:1111 passwo r d:5678 | User should navigat e your home page. | Workin g as expecte d | PASS | Succ ess ful | | | GAYATHRI T |
| | | | | | butto n | | | | | | | | |
| LOGIN | FUNCTI ONA | LOGI N | VERIFY | | 1.ent er url | Id:1111 | Confirm | Workin | PASS | Succ ess | | | BENINAL D |

| | | | | | | | | | | | | |
|-------------------|------------|----------------------|---|--|----------------------|-------------------------------|---------------------|------|------------|--|--|---------------|
| PAGE_TC_004 | L | PAGE | THE USER IS ABLE TO SEE THE LOGIN/SIGN UP WHEN USER CLICK ON MY ACCOUNT BUTTON | and click go 2.click on my account 3.Enter valid ID 4.Enter valid password 5.click on login button | password:5678 | Confirmation message sent | Working as expected | | ful | | | |
| LOGIN PAGE_TC_005 | UI | LOGIN PAGE | VERIFY THE USER IS ABLE TO SEE THE LOGIN/SIGN UP WHEN USER CLICK ON MY ACCOUNT BUTTON | 1.enter url and click go 2.click on my account 3.Enter valid ID 4.Enter valid password 5.click on login button | Id:111 password:5678 | Confirmation message sent | Working as expected | PASS | Successful | | | KRISHNAVENI P |
| LOGIN PAGE_TC_006 | FUNCTIONAL | LOGIN PAGE FOR ADMIN | VERIFY THE USER IS ABLE TO SEE THE LOGIN/SIGN UP WHEN USER CLICK ON MY ACCOUNT BUTTON | 1.enter url and click go 2.click on my account 3.Enter valid ID 4.Enter valid password 5.click on login button | Id:111 password:5678 | Custom er database is visible | Working as expected | PASS | Successful | | | GAYATHRI T |

User acceptance Testing:

1.Purpose of Document

The purpose of this document is to briefly explain the test coverage and open issues of the [Protect Name] project at the time of the release to User Acceptance Testing (UAT).

2. Defect Analysis

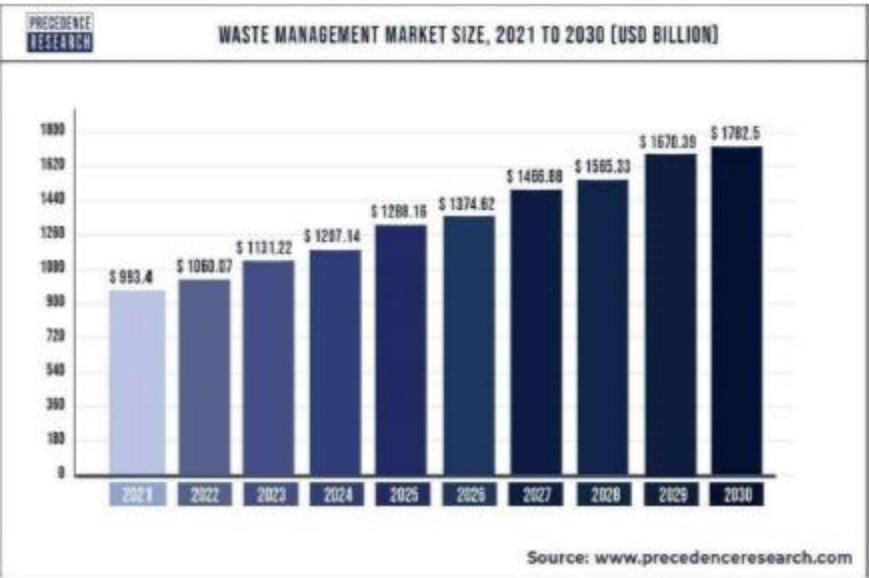
This report shows the number of resolved or closed bugs at each severity level, and how they were resolved

| Resolution | Severity 1 | Severity 2 | Severity 3 | Severity 4 | Subtotal |
|------------|------------|------------|------------|------------|----------|
| By Design | 10 | 4 | 2 | 3 | 20 |
| Duplicate | 1 | 0 | 3 | 0 | 4 |
| External | 2 | 3 | 0 | 1 | 6 |
| Fixed | 11 | 2 | 4 | 20 | 37 |

| | | | | | |
|----------------|----|----|----|----|---|
| Not Reproduced | 0 | 0 | 1 | 0 | 1 |
| Skipped | 0 | 0 | 1 | 1 | 2 |
| Won't Fix | 0 | 5 | 2 | 1 | 8 |
| Totals | 24 | 14 | 13 | 26 | 7 |

9. RESULTS

9.1 PERFORMANCE MATRICS



10. ADVANTAGES & DISADVANTAGES

Advantages:

- *Efficient and effective Functioning.
- *Cleaner Environs
- *Better health issues
- *Pollution free and stinking free environs
- *Smart cities
- *Technology development
- *Tourist attraction.

Disadvantage:

- *Sensor nodes used in the dustbins have limited memory size.
- *Wireless technologies used in the system such as zigbee and wifi have shorter range and lower data speed.
- *It reduces man power requirements which results into increase in unemployments for unskilled people.
- *The training has to be provided to the people involved in the smart waste management system.

11. CONCLUSION:

Improper disposal and improper maintenance of domestic waste create issues in public health and environment pollution thus this paper attempts to provide practical solution towards managing the waste collaborating it with the use of IOT i.e. providing free internet facilities for a specific time once the trash is dumped into the bin. the proposed system will definitely help to overcome all the serious issues related to waste and keep the environment clean

12. FUTURE SCOPE:

The moisture sensor can be implemented hand in hand with the other sensors and the compartments for segregating the dry and wet waste can be created which will solve the issues related to waste segregation

13.APPENDIX

```
loadcell.py - C:\Users\ELCOT\Desktop\loadcell.py (3.7.0)
File Edit Format Run Options Window Help

import requests
import json
import ibmiotf.application
import ibmiotf.device
import time
import random
import sys

# watson device details
organization = "lhx6w"
deviceType = "new"
deviceId = "12345"
authMethod = "token"
authToken = "123456789"

#generate random values for random variables (temperature&humidity)

def myCommandCallback(cmd):
    global a
    print("command recieved:%s" %cmd.data['command'])
    control=cmd.data['command']
    print(control)

try:
    deviceOptions={"org": organization, "type": deviceType,"id": deviceId,"auth-method":authMethod,"auth-token":authToken}
    deviceCli = ibmiotf.device.Client(deviceOptions)
except Exception as e:
    print("caught exception connecting device %s" %str(e))
    sys.exit()

#connect and send a datapoint "temp" with value integer value into the cloud as a type of event for every 10 seconds deviceCli.connect()
while True:
    distance= random.randint(10,70)
    loadcell= random.randint(5,15)
    data= ('dist':distance,'load':loadcell)
    if loadcell < 13 and loadcell > 15:
        load = "90 %"
    elif loadcell < 8 and loadcell > 12:
        load = "60 %"
    elif loadcell < 4 and loadcell > 7:
        load = "40 %"
    else:
        load = "0 %"

    if distance < 15:
        dist = 'Risk warning: ' 'Dumpster poundage getting high, Time to collect :) 90 %'
    elif distance < 40 and distance > 16:
        dist = 'Risk warning: ' 'dumpster is above 60%'

    elif distance < 60 and distance > 41:
        dist = 'Risk warning: ' '40 %'
    else:
        dist = 'Risk warning: ' '17 %'
    if load == "90 %" or distance == "90 %":
        warn = 'alert : ' ' Dumpster poundage getting high, Time to collect :)'
    elif load == "60 %" or distance == "60 %":
        warn = 'alert : ' 'dumpster is above 60%'
    else:
        warn = 'alert : ' 'No need to collect right now'
    def myOnPublishCallback(lat=10.678991,lon=78.177731):
        print("Gandigramam, Karur")
        print("published distance = %s " %distance,"loadcell:%s " %loadcell,"lon = %s " %long,"lat = %s " %lat)
        print(load)
        print(dist)
        print(warn)

        time.sleep(10)

    deviceCli.publishEvent("temp",{"temp":load,"dist":dist,"warn":warn},myOnPublishCallback)

Ln: 1 Col: 0

loadcell.py - C:\Users\ELCOT\Desktop\loadcell.py (3.7.0)
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sys.exit()

#connect and send a datapoint "temp" with value integer value into the cloud as a type of event for every 10 seconds deviceCli.connect()
while True:
    distance= random.randint(10,70)
    loadcell= random.randint(5,15)
    data= ('dist':distance,'load':loadcell)
    if loadcell < 13 and loadcell > 15:
        load = "90 %"
    elif loadcell < 8 and loadcell > 12:
        load = "60 %"
    elif loadcell < 4 and loadcell > 7:
        load = "40 %"
    else:
        load = "0 %"

    if distance < 15:
        dist = 'Risk warning: ' 'Dumpster poundage getting high, Time to collect :) 90 %'
    elif distance < 40 and distance > 16:
        dist = 'Risk warning: ' 'dumpster is above 60%'

    elif distance < 60 and distance > 41:
        dist = 'Risk warning: ' '40 %'
    else:
        dist = 'Risk warning: ' '17 %'
    if load == "90 %" or distance == "90 %":
        warn = 'alert : ' ' Dumpster poundage getting high, Time to collect :)'
    elif load == "60 %" or distance == "60 %":
        warn = 'alert : ' 'dumpster is above 60%'
    else:
        warn = 'alert : ' 'No need to collect right now'
    def myOnPublishCallback(lat=10.678991,lon=78.177731):
        print("Gandigramam, Karur")
        print("published distance = %s " %distance,"loadcell:%s " %loadcell,"lon = %s " %long,"lat = %s " %lat)
        print(load)
        print(dist)
        print(warn)

        time.sleep(10)

    deviceCli.publishEvent("temp",{"temp":load,"dist":dist,"warn":warn},myOnPublishCallback)

Ln: 1 Col: 0
```

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loadcell.py - C:\Users\ELCOT\Desktop\loadcell.py (3.7.0)
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elif distance < 60 and distance > 41:
    dist = 'Risk warning: ' + '40 %'
else:
    dist = 'Risk warning: ' + '17 %'
if load == "90 %" or distance == "90 %":
    warn = 'alert : ' + ' Dumpster poundage getting high, Time to collect :)'
elif load == "60 %" or distance == "60 %":
    warn = 'alert : ' + 'dumpster is above 60%'
else:
    warn = 'alert : ' + 'No need to collect right now'
def myOnPublishCallback(lat=10.678991, long=78.177731):
    print("Gandigramam, Karur")
    print("published distance = %s " % distance, "loadcell: %s " % loadcell, "lon = %s " % long, "lat = %s " % lat)
    print(load)
    print(dist)
    print(warn)

    time.sleep(10)

    success=deviceCli.publishEvent ("IoTSensor", "json", warn, qos=0, on_publish= myOnPublishCallback)

    success=deviceCli.publishEvent ("IoTSensor", "json", data, qos=0, on_publish= myOnPublishCallback)

if not success:
    print("not connected to ibmiot")
    time.sleep(30)

deviceCli.commandCallback=myCommandCallback #disconnect the device
deviceCli.disconnect

Ln: 1 Col: 0
```

GITHUB LINK

https://drive.google.com/file/d/1seFVsv1NS_nBOvqucu9vtO8rVhKfbCM5/view?usp=share_linkC:\Users\kavi\Downloads\project%20report.docx